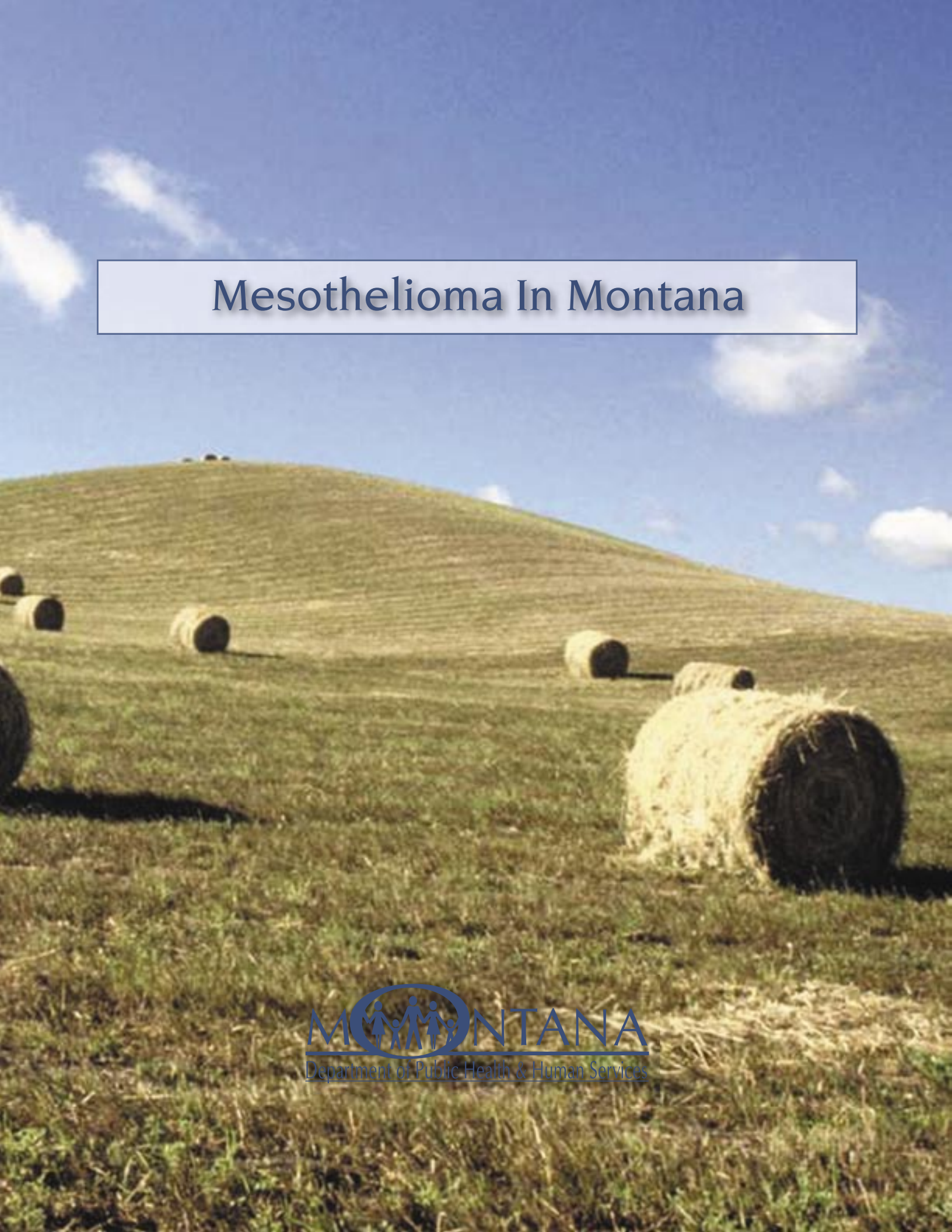
Mesothelioma In Montana



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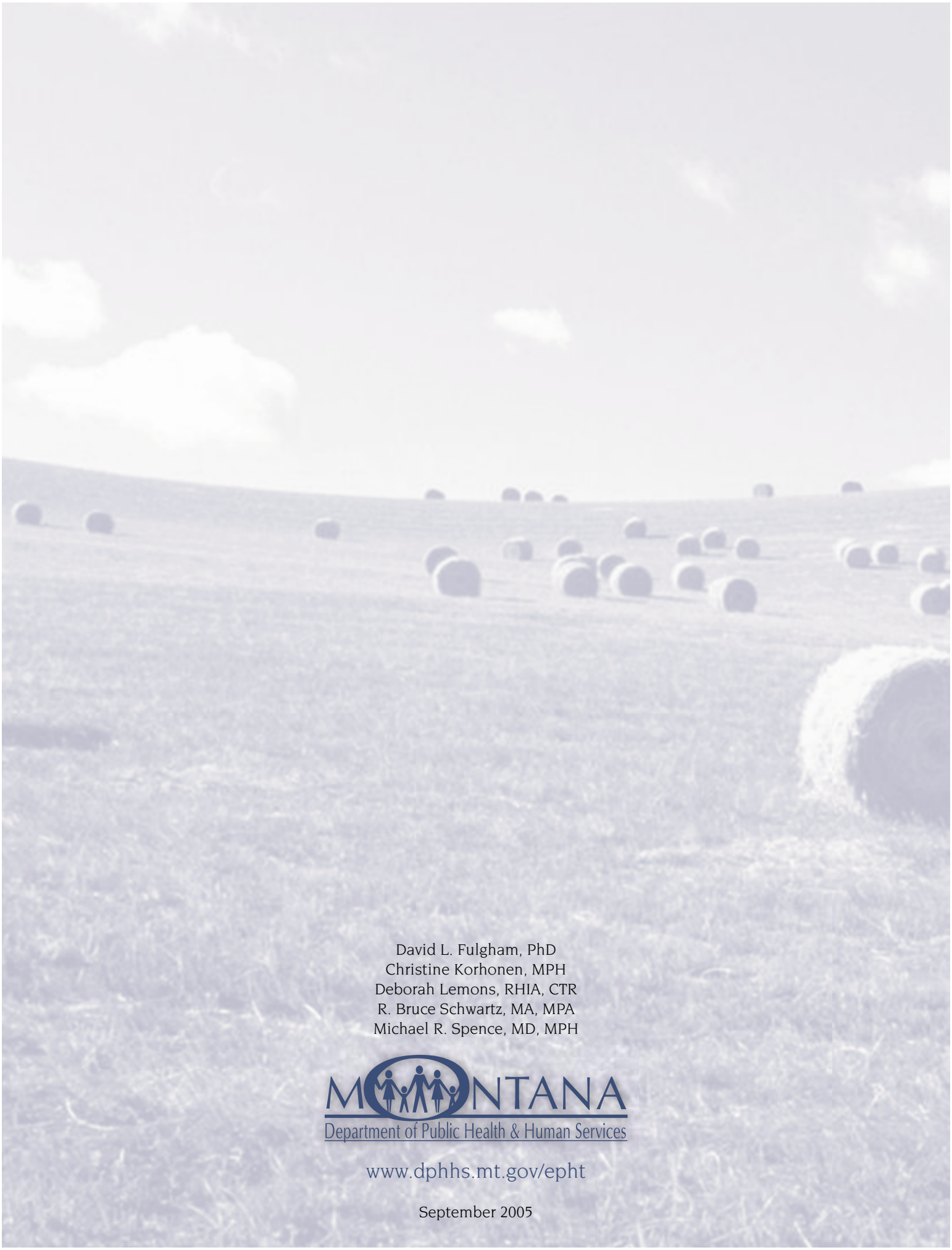

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September 2005

INTRODUCTION

Mesothelioma is a rare cancer of the mesothelium, the tissue that covers the lungs and abdominal organs. These tumors tend to spread rapidly and may not be responsive to current cancer treatments. Many patients die within two years of being diagnosed.[1] Therefore, prevention is the best way to combat this cancer.

Mesothelioma was first described in the 1700s,[2] and by the 1930s the tumors were suspected to be associated with occupational exposure to asbestos.[3] In 1960, a physician in South Africa noticed that 85% of his mesothelioma patients had worked in or lived near asbestos mines.[4] The relationship between asbestos exposure and mesothelioma has now been well documented.[5-8] At least 70% of people with mesothelioma report being exposed to asbestos.[1]

WHAT IS ASBESTOS?

Asbestos is a lightweight mineral made up of millions of tiny, heat-resistant fibrils (figures 1 & 2). These fibers make the material a good insulator. Asbestos was used extensively in housing construction and ship insulation prior to 1999. Because of its light weight, it was also used as a filler in concrete.[9,10]

Asbestos has been linked to lung cancer and other lung conditions in addition to mesothelioma. Because of this, in 1989 the United States Environmental Protection Agency (EPA) banned many uses of asbestos in the United States. The ban was later revised and not implemented until 1999.[11,12] However, asbestos can still be found in new materials such as flooring tiles, automotive brake pads, cement products, and asbestos clothing.[12] Asbestos products made before the ban also still remain.

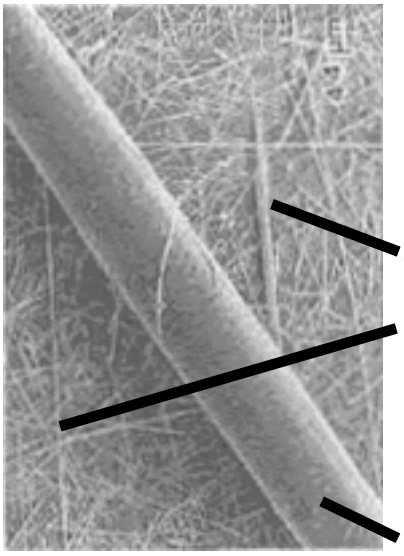

Figure 1. Asbestos fibers compared to a human hair

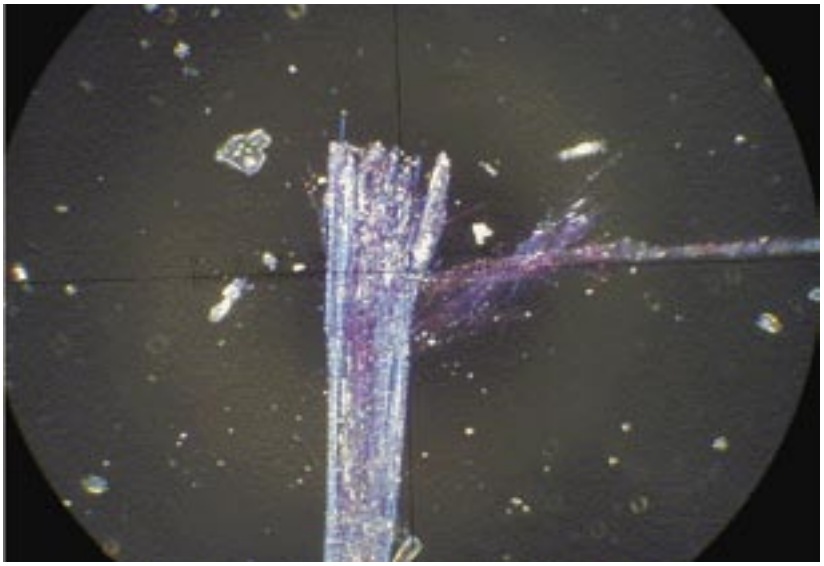

Figure 2. Asbestos fibrils

HOW DOES ASBESTOS CAUSE HARM?

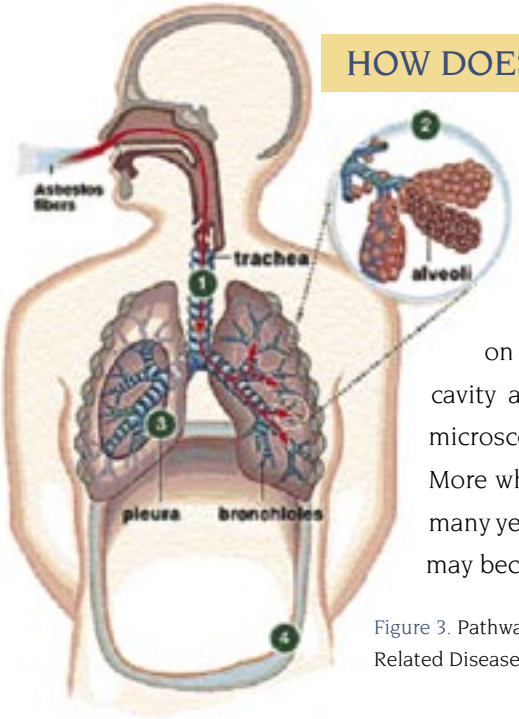

Figure 3. Pathway to Asbestos Related Disease

Asbestos fibrils are small and can be easily breathed in. Once in the lungs, these tiny fibers may penetrate between the lung cells and enter the chest cavity[13] (figure 3). There, the fibrils are recognized as foreign material by the body, and white blood cells are sent to attack with enzymes. Enzymes have little effect on asbestos but can cause damage to the tissues that line the chest cavity and cover the lungs. Because of the action of these enzymes, microscopic scars form on the tissue surrounding the asbestos fibrils. More white cells arrive with more enzymes, repeating the process. Over many years, these scars can enlarge and merge together. The scarred cells may become cancer cells, developing into mesothelioma.[14]

WHAT IS THE MAJOR SOURCE OF ASBESTOS IN MONTANA?

In Montana, asbestos mining became industrially important in the 20th century. Asbestos and vermiculite (figure 4), another insulating mineral, were mined in several areas of Montana. There were several asbestos and/or vermiculite mines in Montana, all of them located in the western half of the state (figure 6). Vermiculite Mountain, outside of the community of Libby, was the site of Montana's largest vermiculite mine (figure 5). It operated from the 1920s until 1990. At one time, Vermiculite Mountain was the source of over 80% of the world's vermiculite[9,10]. Unfortunately, much of the vermiculite obtained from this mine was contaminated with asbestos.[9] This ore was shipped across Montana on its way around the world (figure 7). Cascade county was a railroad transportation hub and some of the ore was processed at a plant in Great Falls. Many residents of Montana worked in industries which mined, processed, or transported the vermiculite and asbestos ores. There was a large amount of human exposure to these minerals. Constructing homes and workplaces with asbestos insulation and other asbestos products may have also led to exposure. Many of the people with mesothelioma in Montana lived along rail routes that pass through the population centers in the state. Most people in Montana live in these centers, so it is not necessarily unusual that people affected with mesothelioma would live along these routes as well.

Figure 4. Vermiculite that has been "popped" by heating to remove moisture

Figure 5. Vermiculite Mountain in Libby, Montana

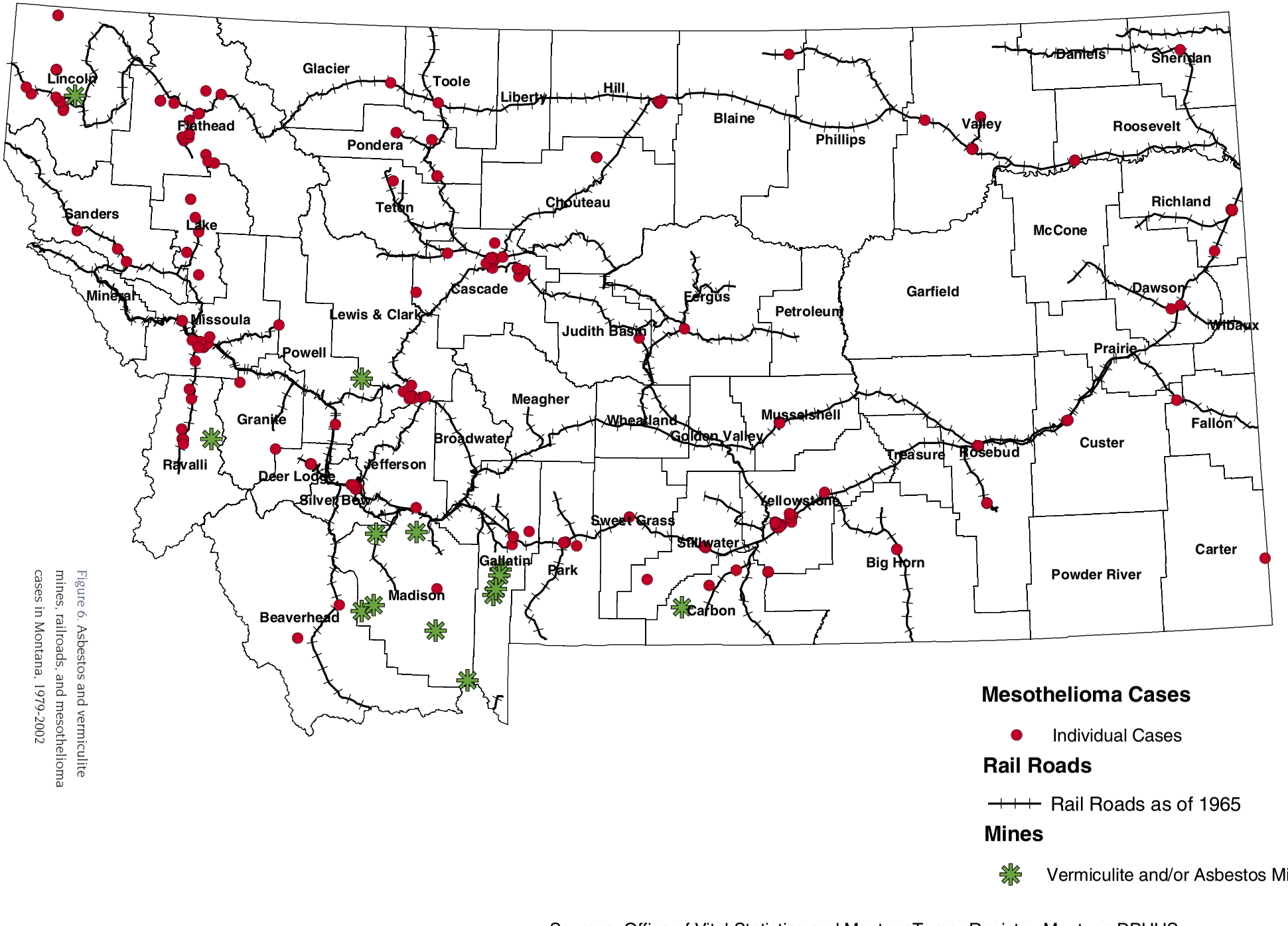

Figure 6. Asbestos and vermiculite mines, railroads, and mesothelioma cases in Montana, 1979-2002

Sources: Office of Vital Statistics and MontanaTumor Registry, Montana DPHHS

Figure 7.
Montana locations receiving vermiculite from Libby, MT, 1920-1990

Montana County Receiving Ore	Tons Shipped
Cascade	23,872
Lincoln	4,543
Gallatin	500
Missoula	17
Yellowstone	9
Flathead	2

Source: Environmental Working Group Action Fund[16]

WHAT DO WE KNOW ABOUT MESOTHELIOMA IN MONTANA?

Death certificates and tumor registry reports are two sources of information that can be used to learn about mesothelioma in Montana. Death certificates have been collected by Montana's Office of Vital Statistics since the 1880s. More recent death certificates have information on age, sex, place of residence, and type of employment, in addition to cause of death. The Montana Central Tumor Registry was established in 1979. This registry holds information on people with diagnosed cancers including their age, sex, and place of residence. The combination of these two data sources allows a more complete understanding of mesothelioma than either would provide alone.

By combining information from both the Montana Central Tumor Registry and Montana Death Registry, 200 Montanans were found who had been diagnosed with or died of mesothelioma between 1979 and 2002 (figures 8 & 9). Individuals in both registries were counted only once. These people lived throughout the state, in counties with asbestos and vermiculite mines and in counties without mines. Neither the tumor registry nor death certificates record time or place of asbestos exposure, so it is unknown whether these people were exposed to asbestos before they developed the disease.

Figure 8.
Number of people diagnosed with mesothelioma in Montana by gender, age group, and year of diagnosis, 1979-2002

Year of Diagnosis	Total Cases	Gender		Age Group					
		Male	Female	19-44	45-54	55-64	65-74	75-84	85+
1979-1982	15	13	2	1	1	2	10	0	1
1983-1986	24	19	5	0	3	6	7	4	4
1987-1990	24	18	6	1	2	5	8	7	1
1991-1994	33	25	8	1	3	8	8	12	1
1995-1998	49	37	12	0	3	12	12	14	8
1999-2002	55	43	12	2	0	12	15	20	6
TOTAL	200	155	45	5	12	45	60	57	21

Sources: Office of Vital Statistics and Montana Tumor Registry, Montana DPHHS

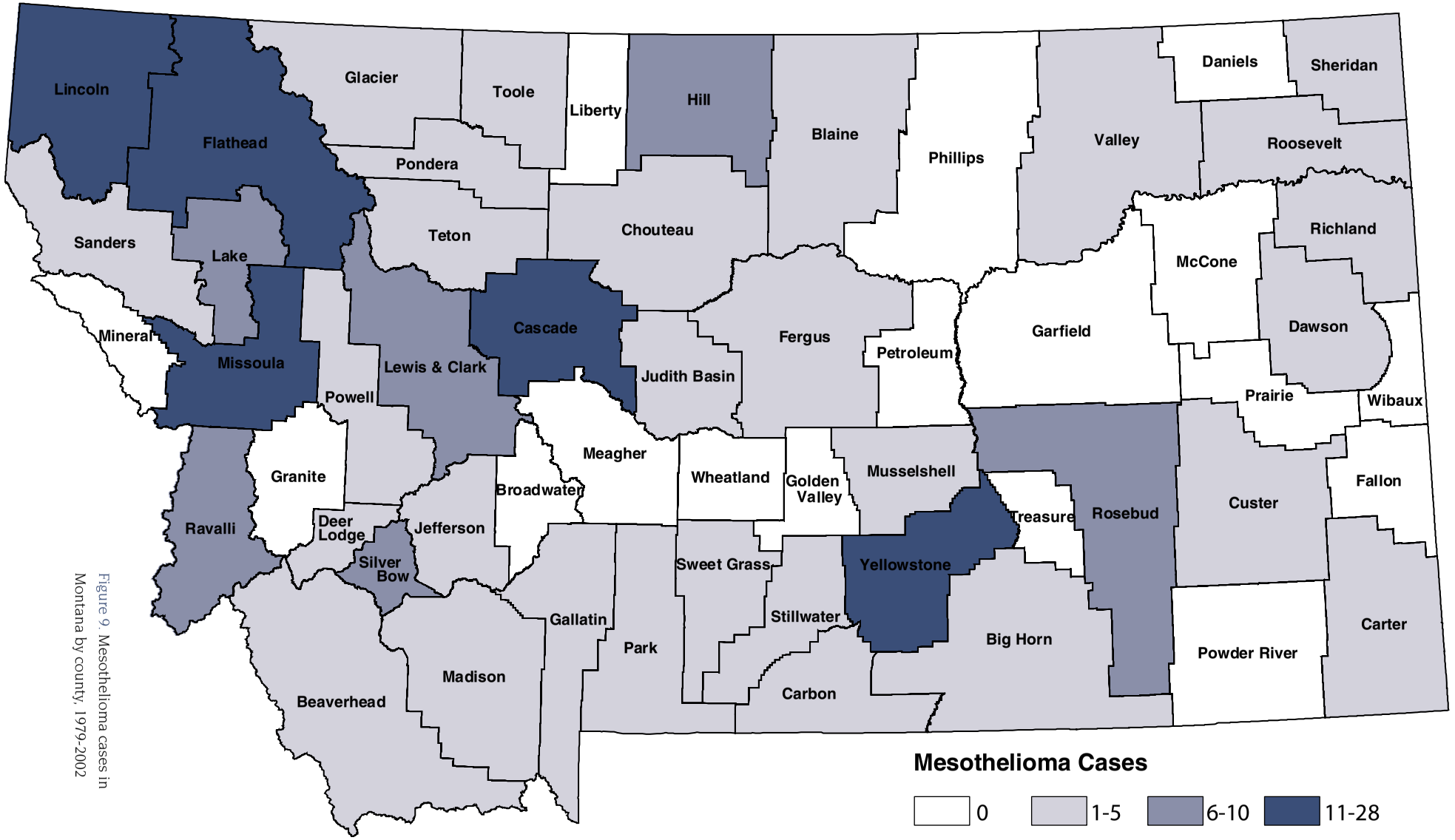

Figure 9. Mesothelioma cases in Montana by county, 1979-2002

Sources: Office of Vital Statistics and MontanaTumor Registry, Montana DPHHS

WHY DID MONTANANS DEVELOP MESOTHELIOMA?

Asbestos exposure is the leading factor in developing mesothelioma, and it is believed that many of the Montanans with mesothelioma were exposed to asbestos, possibly on their jobs or in other aspects of their lives. The Montana Tumor and Death Registries do not collect detailed histories on exposure, employment, or housing. However, the primary industry in which a person worked is recorded at the time of death or diagnosis. This refers to one of the many possible employment areas in which a person may have worked during a lifetime. While these industries may not indicate the source of asbestos exposure in all cases, they may help uncover useful patterns relating to employment and exposure potential.

The primary industries reported among mesothelioma patients in Montana were similar to the industries reported for a study of people who died of mesothelioma from nineteen states in 1999 (figure 10). The industry named most often for both groups was construction. Homemaking was also high on both lists. Although the numbers are relatively small, Montanans with mesothelioma tended to work in government, agriculture, or with the railroads in larger proportions than in the multi-state sample. Mining was captured under "other industries" in the multi-state group but could be identified separately on Montana records. Eight (4%) of the Montana mesothelioma patients had mining listed as their primary industry. Industry was unknown for a large proportion (12%) of the Montana patients. Industry comparisons only provide clues to a possible source of exposure; in-depth residential and employment histories are needed to determine where and when asbestos exposure may have occurred.

Figure 10. Industries recorded for mesothelioma patients, Montana and selected U.S. States

Industries	Montana 1979 - 2003		Selected States* 1999
	Number	Percent	Percent
Construction	22	11.0	14.2
Homemaking	17	8.5	7.0
Manufacturing (unspecified)	17	8.5	1.9
Government	15	7.5	2.4
Agriculture	10	5.0	1.9
Chemical	9	4.5	3.5
Railroads	9	4.5	1.7
Elementary and secondary schools	7	3.5	3.7
Electric light and power	3	1.5	1.9
Hospitals	1	0.5	1.7
All other industries	66	33.0	56.0
Industry not reported	24	12.0	4.3
TOTAL	200	100	100†

* 19 states meeting the National Center for Health Statistics' quality criteria for Industry codes in death certificates. Percents based on 541 deaths in 1999.[17]

† Percents do not add to 100 due to rounding

Sources: Office of Vital Statistics and Montana Tumor Registry, Montana DPHHS; National Institute for Occupational Safety and Health[17]

WHO IS AFFECTED BY MESOTHELIOMA IN MONTANA?

The number of people with mesothelioma identified in Montana was 15 from 1979 to 1982 and 55 from 1999 to 2002 (figure 8). The population of Montana increased by 14% in this period.

A comparison of national data to the combined Montana sample is not possible because no national database has used these methods to combine tumor and death registry records. However, it is possible to compare Montana Central Tumor Registry records with those from the Surveillance, Epidemiology and End Results (SEER) registry. SEER is a group of selected tumor registries around the country supported by the National Cancer Institute. The age-adjusted rate for mesothelioma in the SEER registries has remained relatively constant over the past twenty years (figure 11).

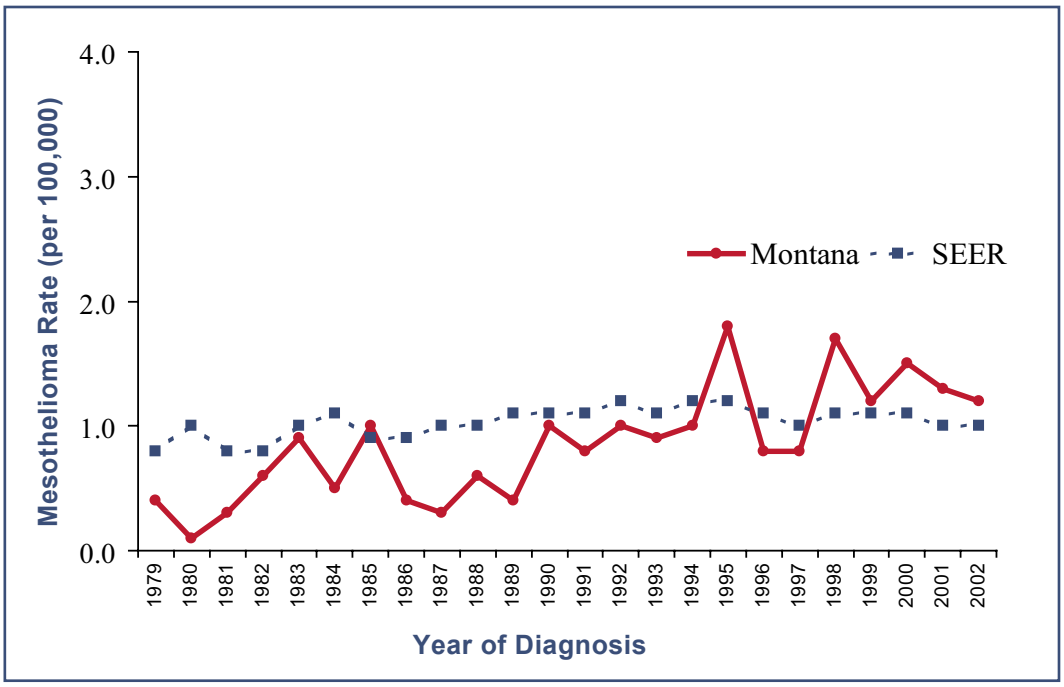

Figure 11. Age-adjusted mesothelioma rate, Montana and SEER tumor registries, 1979-2002

The SEER registries reported about one person with mesothelioma for every 100,000 people each year from 1979 to 2002. Among the 200 people with mesothelioma in Montana, 178 were reported to the Montana Central Tumor Registry. The age-adjusted rate of mesothelioma in the Montana Central Tumor Registry tripled from 1979 to 2002. In 1979, 0.4 per 100,000 Montanans were diagnosed with mesothelioma. By 2002, 1.2 per 100,000 people in Montana were diagnosed with mesothelioma. These rates come from small numbers of people with mesothelioma, and much of this variation may be due to chance.

Since mesothelioma develops very slowly, most people are not diagnosed until they are over 60 years old. The median age at diagnosis for Montanans with mesothelioma was 70 years for men and 71 years for women. Since mesothelioma may take 20 to 40 years to develop[15], it is not often found in younger age groups. The vast majority (81%) of people with mesothelioma in Montana were over 60 years of age when they were diagnosed. More than three-quarters (78%) of the Montanans diagnosed with mesothelioma were men (figure 8).

The length of survival from time of diagnosis could be calculated for 172 Montanans with mesothelioma who died prior to 2002. The median length of survival was 5.5 months — 5.4 months for the 135 men and 5.6 months for the 37 women.

WHAT ARE SOME OF THE LIMITS TO EPIDEMIOLOGICAL INVESTIGATIONS?

Even though asbestos exposure is the most likely cause of mesothelioma, it is often difficult to determine if, where, and when a person with mesothelioma was exposed to asbestos. The long latency period, along with the high degree of mobility of the population, makes determining a definite place and time of exposure difficult.

Some areas in Montana seem to have had more mesothelioma cases than others. Based on the standard morbidity ratio, Lincoln, Cascade, and Rosebud counties had more people diagnosed with mesothelioma from 1979 to 2002 than would be expected based on their populations (figure 12). Gallatin county had fewer people diagnosed with mesothelioma than expected. Since available registries do not include residential histories, it is unknown how long these Montanans lived in these counties. Due to the high mobility of the population, they may have lived elsewhere before moving to the counties where they were diagnosed.

While mesothelioma has been diagnosed in people living throughout Montana, it is very difficult to link environmental hazards with health effects such as cancer. This link is somewhat simplified with mesothelioma since the disease currently has one widely recognized risk factor – exposure to asbestos. Although asbestos and vermiculite were mined primarily in Western Montana, the ore was transported great distances both in and out of the state, resulting in the potential for many people to be exposed. Many of the people with mesothelioma in Montana lived along rail routes in the populated centers in the state. However, the available data are insufficient to confirm a casual relationship between residence near a railroad and developing mesothelioma. Since most of the people in Montana live in these population centers, and along transportation routes, one would expect that many people affected with mesothelioma would live along these routes whether or not the railroad contributed to the spread of the disease. People with mesothelioma may have been exposed to any number of asbestos sources at any time. Information in this report is not sufficient to draw links between sources of asbestos and an individual's mesothelioma.

People diagnosed with mesothelioma today were likely exposed to asbestos before 1999 when the limited asbestos ban was put into effect. As we progress in time from 1999, the number of new mesothelioma diagnoses for the nation is expected to level off and then begin decreasing.[15]

Figure 12. Expected and observed mesothelioma cases with standard morbidity ratio, selected Montana counties, 1979 - 2002

County	Expected Number of Cases	Observed Number of Cases	Standard Morbidity Ratio (SMR)
Cascade	19	28	1.51
Gallatin	9	3	0.33
Lincoln	4	12	2.83
Rosebud	2	7	4.31
Flathead	15	16	1.08
Missoula	16	16	1.00
Yellowstone	27	23	0.85

WHAT CAN YOU DO?

Although several uses of asbestos have been banned in the US, mesothelioma will continue to affect those people exposed before the limited ban was put into place, and there is still the potential for new exposures. There is currently no cure for mesothelioma. Therefore, the best way to combat this disease is to prevent or limit exposure to asbestos.

If you feel you may have asbestos in your home, it is often best to leave undamaged asbestos material alone unless it is leaking into living space. If you need to disturb or remove asbestos containing materials (ACM's), use trained and qualified contractors. The web sites for the Montana Department of Environmental Quality (DEQ) and the US Environmental Protection Agency (EPA) listed below have more information on asbestos and limiting exposure. Consult with your health care provider if you feel you have been exposed to asbestos or ACM's.

DEQ – Asbestos Control Program

http://www.deq.mt.gov/Asbestos/index.asp
Telephone: (406) 444-5300

EPA – Sources of Indoor Air Pollution - Asbestos

http://www.epa.gov/iaq/asbestos.html

EPA – Asbestos in Your Home

http://www.epa.gov/asbestos/ashome.html
EPA's Toxic Substances Control Act (TSCA) Hotline: (202) 554-1404

RESOURCES

National Cancer Institute

http://www.cancer.gov

Montana Department of Environmental Quality (DEQ)

http://www.deq.mt.gov/asbestos

Montana Asbestos Screening and Surveillance Activity (MASSA)

609 Mineral Avenue
Libby, MT 59923
(406) 293-5060

U.S. Environmental Protection Agency (EPA)

http://www.epa.gov/asbestos

Agency for Toxic Substances and Disease Registry (ATSDR)

http://www.atsdr.cdc.gov

Information on Libby, Montana

http://www.libbymontana.com
http://www.epa.gov/region8/superfund/libby
http://www.atsdr.cdc.gov/HAC/PHA/libby/lib_p1.html

Montana Environmental Public Health Tracking (EPHT)

http://www.dphhs.mt.gov/epht

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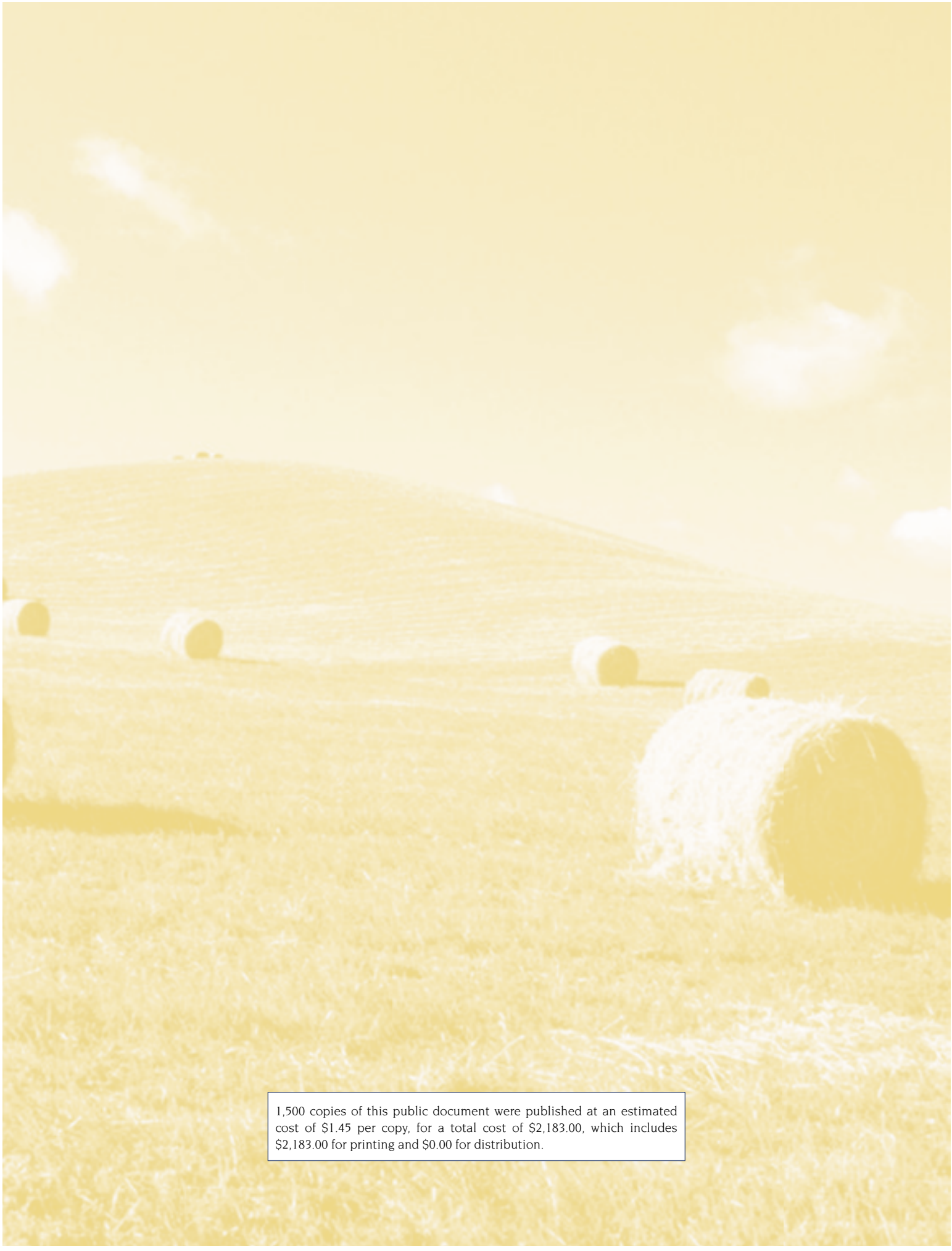
17. Centers for Disease Control and Prevention. Work-Related Lung Disease, Surveillance Report 2002 Atlanta: 2003, p164. http://www.cdc.gov/niosh/topics/ords/NationalStatistics.html



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